



City Research Online

City, University of London Institutional Repository

Citation: Lee, D. & Robinson, L. (2018). The heart of music classification: towards a model of classifying musical medium. *Journal of Documentation*, 74(2), pp. 258-277. doi: 10.1108/JD-08-2017-0120

This is the accepted version of the paper.

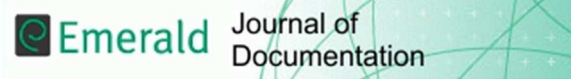
This version of the publication may differ from the final published version.

Permanent repository link: <https://openaccess.city.ac.uk/id/eprint/18647/>

Link to published version: <https://doi.org/10.1108/JD-08-2017-0120>

Copyright: City Research Online aims to make research outputs of City, University of London available to a wider audience. Copyright and Moral Rights remain with the author(s) and/or copyright holders. URLs from City Research Online may be freely distributed and linked to.

Reuse: Copies of full items can be used for personal research or study, educational, or not-for-profit purposes without prior permission or charge. Provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.



The heart of music classification: towards a model of classifying musical medium

Journal:	<i>Journal of Documentation</i>
Manuscript ID	JD-08-2017-0120.R1
Manuscript Type:	Article
Keywords:	Music classification, Musical medium, Classification, Classification models, Instruments, Voices, Facet analysis

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

The heart of music classification: towards a model of classifying musical medium

Abstract

Purpose: This article seeks to understand the classification of musical medium, which is a critical part of music classification. It considers how musical medium is currently classified, provides a theoretical understanding of what is currently problematic, and proposes a model which rethinks the classification of medium and resolves these issues.

Design/methodology/approach: The analysis is drawn from existing classification schemes, additionally using musicological and knowledge organization literature where relevant. The article culminates in the design of a model of musical medium.

Findings: The analysis elicits sub-facets, orders and categorizations of medium: there is a strict categorization between vocal and instrumental music, a categorization based on broad size, and important sub-facets for multiples, accompaniment and arrangement. Problematically, there is a mismatch between the definitiveness of LIS vocal/instrumental categorization and the blurred nature of real musical works; arrangements and accompaniments are limited by other categorizations; multiple voices and groups are not accommodated. So, a model with a radical new structure is proposed which resolves these classification issues.

Research limitations/implications: The results could be used to further understanding of music classification generally, for Western art music and other types of music.

Practical implications: The resulting model could be used to improve and design new classification schemes and to improve understanding of music retrieval.

Originality/value: Deep theoretical analysis of music classification is rare, so this article's approach is original. Furthermore, the article's value lies in studying a vital area of music classification which is not currently understood, and providing explanations and solutions. The proposed model is novel in structure and concept, and its original structure could be adapted for other knotty subjects.

Introduction

Music classification has both inspired and irritated for the best part of a century. The voluminous discourse about music classification (see, for example, bibliographies by Nettl (1960) and Smiarglia and Young (2006)), coupled with the many published and unpublished classification schemes for music, indicate a subject which is difficult to classify. Yet, the collective knowledge about music classification within library and information science (LIS) shows that we still do not fully understand why music is difficult to classify or what is happening when music is being classified; furthermore, with a few notable exceptions, no substantial attempt has been made to consider music classification from a conceptual basis. So, this article investigates one particular area of music

classification from a theoretical perspective: the facet of musical “medium”. The medium of a musical work is the instrument(s) and/or voice(s) required to play and/or sing that work. Examining music classification reveals that medium is a multipart and complex part of musical works; so, as medium is also a fundamental part of classifying music, unpicking the complexities of classifying musical medium will greatly aid our understanding of music classification. Therefore, this article analyses how medium is typically classified and provides an explanation for medium’s complexities, then suggests a radical new way of thinking about this area of music classification, and indeed classification more generally.

The importance of medium to understanding the complexities of classifying music was revealed in the author’s doctoral dissertation (Lee, 2017a) which examined the classification of notated Western art music, and the discussions in this article evolve from this thesis. However, this article is focused on the mechanisms of one particular facet of music: musical medium. After a brief discussion about methodology, the type of music information considered in this research is considered, followed by a discussion of musical medium as a musicological concept and as a facet. Then the elements which constitute musical medium are delineated, aided by an examination of three example LIS classification schemes for music. Three areas of medium classification are analysed, which illuminate issues within LIS classifications of medium. First, the vocal/instrumental categorization is explored, which shows how this seldom-discussed division drives music classification within LIS schemes, yet musical works do not always follow such a strict division. Second, issues with classifying arrangement and accompaniment are discussed. Third, the classification of multiple musical things is unpicked, in particular multiple voices and groups. Finally, a model is presented which reconceives the classification of musical medium and offers solutions to the various issues with classifying medium through a novel structure. Medium is at the heart of music classification and this article shows how its complexities can be dissected, modelled and re-thought.

Methodology

There are two main methods used in this study. First, a qualitative method is used, which could be described as a kind of content analysis approach, which in appropriate sections analyses existing discourse in the LIS and music domains. For example, both LIS and music domain literature are consulted when discussing the importance of the musical medium facet. Note that writings from music information retrieval (MIR) have not been utilized; as will be discussed in Section “Which music information?”, this research is primarily discussing the classification of notated music, whereas MIR is interested in music as sound.

Second, this study analyses existing LIS classification schemes for music to investigate the classification of musical medium. As well as providing examples of sub-facets and citation orders, classification scheme analysis was used as the source of information about LIS classification of specific parts of medium, as details about classifying medium are rarely discussed in music LIS discourse. For example, the critical vocal/instrumental categorization is not discussed in LIS discourse, in contrast to other structural features such as categorization by format and the facets of music, which are prolific topics for discussion (Lee, 2012).

Two sets of schemes were utilized in this study: a group of three special schemes for music when more detailed analysis was needed, and a broader group of 16 other schemes for wider and

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

shallower information. Both sets of schemes were selected using purposive sampling. Neither set was intended to be used for quantitative analysis, outside an occasional approximate idea of majority or common practice. The three main example schemes are as follows: Coates' *British Catalogue of Music Classification* (Coates, 1960, abbreviated to *BCMC*), Pethes' *Flexible classification system of music and literature to music* (Pethes, 1967, abbreviated to *Flexible*) and Dickinson's *Classification of musical compositions: a decimal-symbol system* (Dickinson, 1938, abbreviated to *Dickinson*). These three schemes are not limited to a specific type of user, meaning that both the performer and music researcher perspective is covered when analysing these three example schemes. (The connection between music classification and its users is outside of the scope of this paper, but a brief summary of literature about the relationship between music library users and music classification can be found in Lee (2017a, p. 52).) The wider set of 16 schemes are used alongside the three main example schemes to make a broad and general statement about LIS classification; on occasion, one of the 16 schemes provides a specific example of a phenomenon, and in these cases, full reference to the scheme is made. The 16 schemes are as follows: Ayer's *Shelf classification of music*; Bliss *Classification*, 1st edition; Colon *Classification*, 6th edition, revised version; Colon *Classification*, 7th edition; Cutter's *Shelf classification of music*; Dewey *Decimal Classification*, 13th edition; Dewey *Decimal Classification*, 19th edition; Dewey *Decimal Classification*, 22nd edition; Cutter's *Expansion Classification*; Haroon's revised music schedules for the Colon *Classification*; Library of Congress *Classification*, schedules for M, downloaded in 2015; McColvin and Reeves' Dewey *Decimal Classification* revision, in the edition by Dove; Olding's *A system for classification of music and related materials*; Ott's *The role of music in public libraries*; Duff Brown's *Subject Classification*; Universal *Decimal Classification*, 3rd edition, standard edition. Note that only classification schemes were used rather than other types of knowledge organization system (KOS); pertinently, the Library of Congress' *Medium of Performance Thesaurus for Music* is not discussed, as besides not being strictly a classification scheme, it does not primarily consider the relationships between different parts of medium, which is the focus of this article.

The context of music and musical medium

Which music information?

This article is concerned with a specific type of music information: music itself. This means that, for instance, books about music, audio-visual documentaries about specific groups or composers, and so on, are not considered. Even just considering "music itself" requires more unpicking. Is music sound, notation, something else entirely, or a mixture of all of these? For example, the eminent music philosopher Dahlhaus (1982, p. 12) argues that a "musical fact" includes musical notation within its constitution, and regarding music only as what is "audible" is problematic (Dahlhaus, 1982, p. 13). This study follows Dahlhaus' lead in ascribing much importance to music-as-notation. Moreover, this paper is going to focus primarily on music in its notated form: one reason for this is that the classification schemes which are the basis of analysis were primarily designed to classify music-as-notation, rather than music-as-sound. So, "music" refers to music in notated form when used in the phrase "music classification". (Note that "notated music" is used in this article as a broad term to include both printed and digital expressions of that music, rather than alternative terms such as "score" or "sheet music" that might be associated with particular types of music or imply only printed music.)

Another question arises when dealing with music classification about what type of music is being considered, where type could refer to coarse categories such as “art music”, “popular music”, “traditional music”, and so on. This paper considers musical medium, which is a valid facet for arguably all types of music: if music is defined as either sound or the potential to produce sound, then what and who are making that sound, the medium, is a part of music’s classification question, whatever context of that music’s creation and delivery. However, the way that medium functions within music is different depending on the type of music. While there is not space in this article to discuss differences between the importance and function of medium for different types of music, the following is surmised. While the model developed in this article is applicable to music generally, the practical and conceptual problems of music classification germinate in schemes which deal primarily with a special type of music: “Western art music”. “Art music” refers to a type of music often defined only by what it is not: art music is *not* “popular music” or “folk music” – see for example, the definitions in *Oxford English Dictionary* (2008) and *Webster Merriam Dictionary* (2016). “Western” is used to distinguish the geographic originals of this art music, and is taken to very loosely cover the art music of traditional music history focussing primarily on Europe with the addition of North America from post European colonisation onwards.

Defining medium from a music philosophy perspective

In order to investigate medium as a facet it is necessary to define exactly what is meant by “medium”. Music philosophy provides a structural framework for this question. In its simplest form, Davies (2011, p. 48) defines music medium as “... something that serves as a means, or instrument, whereby some content is transmitted from a source to a receiver”. However, different philosophical positions are presented when considering the precise constituency of the “something”, “content”, “transmitted”, and so on.

The sonicism viewpoint considers music by how it sounds, rather than how the sound is made (Matheson and Caplan, 2011, p. 41). A pure sonicist is only concerned with the notes/pitches, length of these pitches, and so on, not the timbre of the instruments (or voices) sounds used to make them (Davies, 2011, pp. 54-55). So, the same sequence of notes played on a violin and flute would satisfy a pure sonicist as being the same work; conversely, a timbral sonicist would not consider both of these sequences to be the same, as they care about the resonances and characters of the particular instruments or voices (Davies, 2011, pp. 54-55). Instrumentalism (Davies, 2011, p. 55) is interested in the particular qualities of the instruments (or voices) who play (or sing) them, but in a stage further than the timbral sonicist, also requires that the actions causing the sound happen as the composer intends, even if the resulting sound is identical. So a synthesized violin and acoustic violin’s performance of the same work would be considered different works by the instrumentalist. Reading these music philosophy positions from a classificationist perspective, the pure sonicist does not use medium at all, as it does not distinguish between, say, the flute and violin. Both the timbral sonicist and instrumentalist use medium as a facet, but define this medium facet in a different way. The timbral sonicist defines medium as the qualities of sound made by instruments and voices, not caring how those sounds are made – for instance, a synthesized violin is the same as an acoustic violin; conversely, the instrumentalist defines medium by how the sound is made, not its aural qualities – so, the synthesized violin is a different medium from the acoustic violin. So, this article, and LIS classification of notated music generally, falls within the instrumentalist’s viewpoint: medium

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

is defined as the instruments and voices needed to perform the music, in the exact formation specified by the composer.

Medium as a facet

Medium is an important facet for classifying notated Western art music. There are many ways to confirm this, and this article gives one type of source: music classification discourse. For instance, Line (1952, p. 362) states that “medium” is the primary characteristic in most classification schemes, while Bryant and Marco (1985, p. 208) state that when “medium” is the primary characteristic then form is usually the secondary one. In fact, so established is the medium-then-form system of classifying music, that Elliker (1994, p. 1317) labels such a system as “traditional”. The music knowledge organization discourse is also a valuable source for opinions and ideas about why “medium” is one of the two prevalent facets. For example, Line (1963, p. 352) suggests that different mediums are easier to distinguish from each other than different forms. Smiraglia and Young (2006, p. 7) take a more conceptual approach when discussing the representation of music scores in a subject catalogue: “form” and “medium” have to be used to *arrange* music as “form” and “medium” *are* music. It is also useful to note that while medium as a facet is not unique to notated Western art music, medium will have a different structure and level of importance for different types of music and different formats of music-related materials; so for instance, medium’s centrality as a facet for *notated* Western art music is not necessarily shared by classifications of *literature* about Western art music. (Please see Lee (2017a) for a fuller discussion about the importance of the medium facet for music classification.)

Formatted: Font: Italic

Formatted: Font: Italic

It is also important to consider how medium acts as a facet and what is included within a classificatory facet of medium. Medium could be considered as a single facet, or different aspects of medium might be considered as facets in their own right. For example, *BCMC*’s medium facet (called “executant”) includes elements such as the number in an ensemble and the type of instrument; however, Redfern (1978, p. 22), in his system of “meta-facets” for music, lists the number of instruments and types of instrument as individual facets, instead of parts of a single medium facet. The difference between these is visualized in Figure 1 which compares *BCMC*’s and Redfern’s treatment of medium, albeit adopting standardized terms to aid comparison. Theoretically, there is no issue with having multiple elements at work within a single facet, and it is actually quite common (Vickery, 1959, p. 36). In terms of impact, there are only issues with this “telescoped” structure if there is a need for one part of a facet to be interspersed with another facet (Vickery, 1975, p. 33). For instance, the desire for instrument type to be next to form, and arrangement next to format, would be an issue if medium were considered a single, telescoped facet; however, this would not be problematic if instrument type and arrangement were considered to be their own facets, rather than part of a medium facet. For simplicity, this article is going to assume medium is a single facet, as its relationships to facets outside of medium is not being considered. The constituents of medium, such as type of instrument and number in an ensemble, will be labelled as “sub-facets” and the order of those sub-facets within medium will be described as their “citation order”.

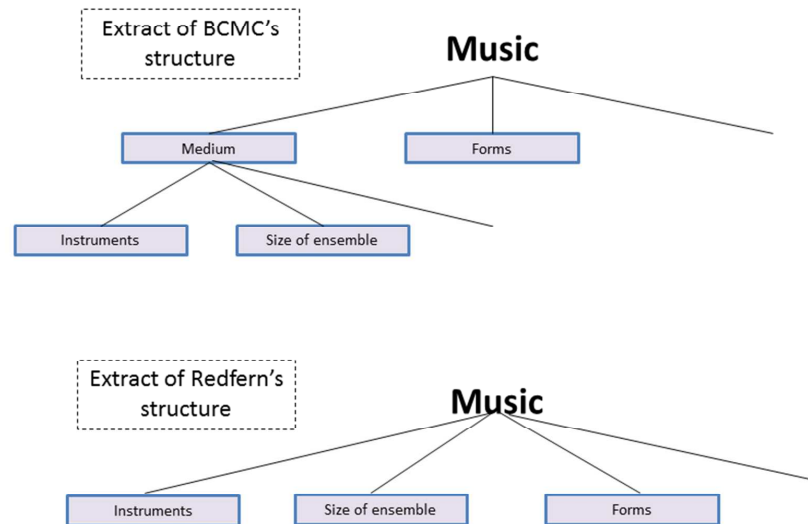


Figure 1. Medium as facet versus sub-facet, in Redfern and BCMC

Determining the sub-facets of musical medium and their order

The elements of musical medium

If musical medium only consisted of instruments, voices or groups, it would be a facet with a list of simple foci – for example, soprano, violin, orchestra, guitar, lyric tenor, and so on – and would not display the complexities which are the heart of (and warrant for) this article. However, musical medium consists of a number of different ideas which form the basis of the sub-facets of medium. These complexities are largely based around three broad concepts: multiples, accompaniment and arrangement.

In musical medium there can be more than one of an instrument, voice or group, and in this article, this is referred to as a “multiple”. Examples include a violin duet, a trio for soprano, tenor and bass, and a work for two separate mixed voice choirs. Multiples are especially common in certain types of Western art music, such as the loose category of music known as “chamber music”, which includes mediums such as the string quartet and piano trio. The term “ensembles” is used in this research to refer to one-per-part set of voices or instruments, which is the most common (but not only) manifestation of “multiples”. The crucial defining feature of the term “multiple” as used in this research is that there is more than one voice, instrument or group, where the exact number of each voice, instrument and group are explicit in the medium; conversely, a “group” is defined in this article to describe examples such as orchestras and choirs, where any individual group consists of

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

numerous voices or instruments, but an indeterminate number of performers of any particular voice or instrument.

In common usage, the term “accompaniment” suggests a secondary and supporting role, which is similar to its colloquial musical usage. Fuller (2016) defines accompaniment as “the subordinate parts of any musical texture made up of strands of differing importance”. This definition is very important, as it helps to answer an important categorization question: accompaniment or multiple? To simplify matters, the question will be specifically asked about a total of two performers. The difference between a duet and an accompaniment is codified by the relationship between them: inequality means that the medium should be classified as lead-and-accompaniment rather than as a group of equal parts (a duet). So, if “m” is medium and for a duet it is assumed that $m = m_x + m_y$, the difference between multiples and accompaniment is as follows:

Accompaniment: $m_x < m_y$

Duet: $m_x = m_y$

While in theory the difference between an accompaniment and duet is clear, in musical practice the definition is not always so definite. For example, the position of the orchestra in Wagner’s works for voices is given as an example of the lines between accompaniment and equal partner blurring in Fuller (2016), and furthermore, according to the noted (pianist) accompanist Gerald Moore, even a seemingly simple accompaniment to a Schubert song is an important part of the musical work (Moore, 1959, p. 14). However, for this article, the conceptual idea of arrangement-accompaniment within medium is taken as being a secondary and supporting role, while acknowledging that determining accompaniment in practical classification of certain musical works might be problematic.

“Arrangement” is the part of musical medium concerned with transformation. A musical work may start life as one musical medium, but the work might be transformed into additional, different mediums over the lifetime of the work. The resulting new version of the work is called an arrangement or a transcription. While both terms can be used to describe transformations of medium, “arrangement” is used in this article to reflect the more common usage in LIS classification schemes – for instance, the term “arrangement” (and its variants) is used more often than “transcription” in the example set of 19 schemes. Arrangements have an extra complexity concerning whether the original or arranged work is the primary medium for the purposes of classification, and this is discussed in detail in the Section “Listing of accompaniment and arrangement foci”. So, if “m” is medium, arrangement describes the case where $m_{\text{actual}} \neq m_{\text{original}}$. However, the ideas of multiples, accompaniment and arrangement only describe the broad elements. In order to ascertain the actual sub-facets used in LIS classification, their stability as sub-facets and their order, it is necessary to analyse some examples of LIS classification schemes.

Analysing example citation orders

Due to the detail required, only three classification schemes are considered: *BCMC*, *Dickinson* and *Flexible* – see Table 1 and Table 2. Even giving a list of sub-facets and their order asks questions about the source and authority of classification scheme information – see Lee (2017b) for more

discussion about types of information about classification schemes and the impact of this on what we “know” about any classification scheme – so it is important to be precise about the source for these example citation orders. *BCMC* (Coates, p. x) gives two ordered lists of what *BCMC* terms “sub-facets” within its “executant facet” (in other words, medium), one for vocal music and the other for instrumental music; however, there are some differences between the stated order of sub-facets and what is actually found in the schedules for vocal music, so both are given in Table 2. The “combination orders” of *Dickinson* (similar to citation orders) cover all aspects of music not just medium, so the aspects related to medium are extracted in Table 1 and Table 2; however, one of *Dickinson*’s unusual features is its alternative citation orders, so all the alternatives are included in Table 1 and Table 2. Unlike the other two schemes, *Flexible* does not explicitly state its citation orders within the medium facet; so, Table 1 and Table 2 are taken from the implied citation orders found within *Flexible*, ascertained from the structure of the schedules and a set of examples in part of the introduction to the scheme entitled “logographs”.

Scheme	Citation order	Source
<i>BCMC</i> (listed)	I → N → Ac → O	Introduction
<i>BCMC</i> (actual)	NX → I → N → Ac → O	Schedules
Dickinson “Combination 1 – Loan and performance libraries”	NX → I → Ac → N → O	Introduction
Dickinson “Combination 2 – Reference and musicological libraries”	NX → I → Ac → Ar → N	Introduction
Dickinson “Combination 2a – Reference and musicological libraries”	NX → I → Ac → N → Ar	Introduction
Dickinson “Combination 2b – Reference and musicological libraries”	NX → I → Ac → N → Ar	Introduction
Dickinson “Combination 3 – General or small libraries”	NX → I → N → O	Introduction
Dickinson “Combination 4 – General or small libraries”	NX → I → N	Introduction
Flexible	NX → N → I → Ac (for groups such as orchestras, “I” can include genre or type of music)	Schedules (Tables: 1 – 4)

Table 1. Sub-facets for instrumental music and the order of their employment, found in *BCMC*, *Dickinson* and *Flexible*

Key: I = instrument; N = total number in ensemble or description of size of group (e.g. size of orchestra); Ac = accompaniment; O = original medium, if classed under arranged medium; Ar = arranged medium, if an arrangement and classed under original medium; NX = whether solo, one-per-part in an ensemble or a group (e.g. an orchestra)

Scheme	Citation order	Source
<i>BCMC</i> (listed)	N → V → Ac	Introduction
<i>BCMC</i> (actual)	NX → V → N → Ac	Schedules (D - K)

BCMC (alternative schedules – choirs)	$NX \rightarrow V \rightarrow S \rightarrow N$ (Alternative schedules are unclear. Probably actually $NX \rightarrow Ac \rightarrow V \rightarrow S \rightarrow N$)	Alternative schedules (DAAX - EH, and accompaniment from EL)
Dickinson “Combination 1 – Loan and performance libraries”	$NX \rightarrow Ac \rightarrow V \rightarrow N \rightarrow T \rightarrow O$	Introduction
Dickinson “Combination 2 – Reference and musicological libraries”	$NX \rightarrow Ac \rightarrow Ar \rightarrow V \rightarrow N \rightarrow T$	Introduction
Dickinson “Combination 2a – Reference and musicological libraries”	$NX \rightarrow Ac \rightarrow V \rightarrow N \rightarrow Ar \rightarrow T$	Introduction
Dickinson “Combination 2b – Reference and musicological libraries”	$NX \rightarrow Ac \rightarrow V \rightarrow N \rightarrow Ar \rightarrow T$	Introduction
Dickinson “Combination 3 – General or small libraries”	$NX \rightarrow V \rightarrow N \rightarrow O$	Introduction; N is included in combination order but omitted in introduction
Dickinson “Combination 4 – General or small libraries”	$NX \rightarrow N$	Introduction; N is included in combination order but omitted in introduction
Flexible	$NX \rightarrow AcX \rightarrow K \rightarrow V \rightarrow Ac$ (solo) $NX \rightarrow K \rightarrow N \rightarrow AcX \rightarrow V \rightarrow Ac$ (ensembles) $NX \rightarrow S \rightarrow AcX \rightarrow K \rightarrow V \rightarrow N \rightarrow Ac$ (groups)	Schedules (Tables: 5 – 7), plus examples in logographs

Key: V = voice type; N = total number in ensemble or number of voices in the choir; NX = whether solo, one-per-part in an ensemble or a group (e.g. a choir); Ac = accompaniment; AcX = whether accompanied or not; S = soloists (in choral music); K = if voice types are known or not; O = original medium, if an arrangement; Ar = arranged medium, if an arrangement and classed under the original medium; T = tessitura, a type of categorization of voice when specific voice-types are not used.

Table 2. Sub-facets for vocal music and the order of their employment, found in *BCMC*, *Dickinson* and *Flexible*

These example citation orders reveal some insights into the mechanisms of medium classification in LIS. First, the schemes illustrate types of sub-facets and their relative frequency. Size appears via two different sub-facets: NX (which is a broad size-based categorization) and N (which is used for multiples, to express the numbers of things). While both relate to size, N and NX are fundamentally different, the difference between NX and N lies in what they are counting: N counts multiple instruments, voices and groups – for instance it counts the “3” in “3 flutes” and the “2” in “2 choirs”. However, NX is more complicated as it is about size and role, rather than counting. NX categorises by size of medium interested in size when dividing between solos and ensembles when differentiating between a single voice/instrument and multiple voices/instruments; yet, when –but is dividing separating out ensembles from groups, NX differentiates based on the relationships that

those individual instruments and voices have to the whole medium. on how individuals fit into the whole, when it is dividing between ensembles and groups. (In theory, for example, a vocal ensemble could feature more voices than a very small choir, so NX is more than just a measurement of size alone.) Interestingly, *BCMC* does not acknowledge the broad size division in its citation orders. This could suggest that NX is an implicit feature of LIS classifications. The citation orders show that both accompaniment and arrangement are sometimes divided into the presence of arrangement/accompaniment and then the exact type of that arrangement/accompaniment. The sub-facets relating to size, the type of instrument/voice, accompaniment and arrangement appear in most citation orders; conversely, the sub-facets relating to aspects such as tessitura (a measure of the pitch of voice, different from but similar to type of voice) and unknown voices are relatively infrequent.

Second, the citation orders indicate some strong patterns concerning order. The need for two different tables for vocal and instrumental music is indicative in its own right of a very strong categorization between voices and instruments; the citation orders were separated because *BCMC* specifies two different citation orders, and the other two schemes demonstrated some differences between the citation orders for instruments and voices, which would have made it very difficult to cover vocal and instrumental music in the same citation order. Within each citation order, the broad number categorization – which covers the division into foci of solo, one-per-part (ensemble) and groups – is always first. Furthermore, *Flexible's* use of three different citation orders for vocal music depending on the type of broad size, also demonstrates the importance of this division. So, it seems that in these three LIS schemes, the first two divisions are fixed: vocal/instrumental categorization, then categorization based on broad size. After this, the order becomes fuzzier: it seems there is no standard order between ideas relating to multiples, accompaniment and arrangement. Some trends within these different orders were seen: for instance, the exact type of accompaniment and arrangement were usually nearer the end of the order. However, lists of sub-facets and their order only give a broad overview of how music medium classification currently works. To unearth the inner mechanisms of musical medium, more detailed analysis is needed of its knotty aspects.

The vocal and instrumental categorization

The example citation orders revealed a notable quality in LIS classification schemes: music is fundamentally dichotomized between music for voices and music for instruments. This seemingly straightforward and binary categorization forms the spine of classifying musical medium, yet proves to be rather complex in its definition and application. The terms “vocal” and “instrumental” are used to describe mediums primarily for voices as opposed to mediums primarily for instruments. While numerous possible terms are suggested by the 19 schemes and from musicological discourse, “vocal” and “instrumental” appear to best marry the home of this categorization within a medium facet and the usage in LIS classification schemes.

Vocal and instrumental categorization in classification schemes

The 19 example classification schemes were consulted to determine the presence of vocal/instrumental categorization. The results are striking: 14 out of the 19 schemes show a primary categorization into vocal and instrumental categories. In some cases, where medium is strictly differentiated as a separate facet, this division appears as the primary categorization within medium; in other cases, usually for more enumerative schemes, the types of music and genres associated

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

with vocal or instrumental music are strongly separated and grouped by the vocal/instrumental division. Furthermore, even a quick glance at these 14 schemes shows the entrenchment of this vocal/instrumental categorization. As mentioned above, *BCMC* specifies separate citation orders for vocal and instrumental mediums, showing the importance and depth of the vocal/instrumental categorization. Although still showing a very important vocal/instrumental categorization, three of these 14 (Ott's scheme and the sixth and seventh editions of *Colon Classification* (Ott, 1961; Ranganathan, 1963; Ranganathan and Gopinath, 1987) are less clear-cut than the others in terms of being the *primary* categorization: the *Colon Classification* separate voices from instruments, but voices are a subset of instruments rather than being on an equal level of the hierarchy (Ranganathan, 1963; Ranganathan and Gopinath, 1987); Ott's classification appears to have tied primary divisions, as its three medium-based classes could be considered as simultaneously divided by both the vocal/instrumental categorization and a size division (Ott, 1961).

Even the five schemes not considered to have primary vocal/instrumental categorization still often display some differentiation; for example, while the main structure of *Dewey Decimal Classification* 13th edition is not based around medium, most of its main categories only include music which is vocal or instrumental, and the categories which (mainly) contain vocal music all appear before the categories which contain instrumental music. In fact, it is only the schemes by Cutter (Cutter, 1891-1904; Cutter, 1902) which show utter indifference to vocal/instrumental categorization. (Why the schemes by Cutter are so different for vocal/instrumental categorization is unknown. Although one possibility is the late 19th and early 20th century dates of Cutter's schemes, Ayer's scheme from a similar year, 1902, does have clear vocal/instrumental categorization, suggesting that time of creation does not (solely) explain why Cutter's schemes are an exception.) Therefore, the categorization between vocal and instrumental music is an important part of musical medium for LIS classification; in fact, this classification scheme analysis demonstrates it is usually the *primary* categorization of musical medium.

Musical works as blurred vocal/instrumental categorization

However, while the LIS classification schemes might typically present a definitive bi-partite system, when considering individual musical works, it quickly becomes clear that there are many situations and individual works which do not demonstrate strict categorization. This is highly problematic for LIS classification purposes. In fact, the fuzziness of real musical works in terms of vocal and instrumental categorization is so engrained within the corpus of Western art music, that it is possible to generalize examples of problematic musical works into types of categorization issues, and to organize these types into a classification system. So, a formative taxonomy (Figure 2) is presented which helps to dissect and process the types of blurring between the instrumental and vocal categories. (This knowledge organization system (KOS) has been called a taxonomy as it conforms loosely to the broad characteristics of taxonomies outlined by Pieterse and Kourie's (2014, p. 221) categorization of various types of KOS.) Most of the categorization issues in the taxonomy have two permutations, depending on the relative positions of vocal and instrumental. One example of a work of Western art music work is given for each class. Note that these musical work examples are not "types" in the formal taxonomical sense of the word, as they do not typify their associated categories.

1. Medium of whole is different from part
 - 1.a. Vocal whole, instrumental part
 - 1.a.i. Overture **Example: Mozart's Overture to *Le nozze di Figaro***
 - 1.a.ii. Inter-act prelude **Example: Wagner's Prelude to Act III from *Lohengrin***
 - 1.a.iii. Ballet/dance movements **Example: Verdi's Ballet Music from *Aida***
 - 1.b. Instrumental whole, vocal part
 - 1.b.i. Choral symphonies where only one part has voices **Example: Beethoven's finale from Symphony No. 9**
2. Transformation of medium
 - 2.a. Original is vocal, performed as instrumental
 - 2.a.i. Normal form is instrumental **Example: Wagner's "Ride of the Valkyries" from *Die Walküre***
 - 2.a.ii. Can be performed as instrumental or vocal **Example: Wagner's "Liebestod" from *Tristan und Isolde***
 - 2.b. Original is instrumental, performed as vocal
 - 2.b.i. Normal form is vocal **Example: Holst's "Jupiter, the bringer of jollity" from *The Planets*, transformed into the hymn *I vow to thee, my country***
 - 2.b.ii. Can be performed as instrumental or vocal **Example: Elgar's *Pomp and Circumstance, No. 1*, sometimes sung with the words *Land of hope and glory***
3. Defying genre expectations
 - 3.a. Vocal genres, with instrumental elements
 - 3.a.i. Whole **Example: Mendelssohn's *Lieder ohne Worte* ("Songs without words")**
 - 3.a.ii. Instrumental movements **Example: "Varhany solo" [movement for organ solo] from Janáček's *Mša Glagolskaja* ("Glagolitic mass")**
 - 3.b. Instrumental genres, with vocal elements
 - 3.b.i. Whole **Example: Holst's *First Choral Symphony***
 - 3.b.ii. Part **Example: Mahler's Symphony No. 2 ("The Resurrection")**
4. Transcriptions
 - 4.a. Transcriptions (inter-vocal/instrumental transcriptions)
 - 4.a.i. Transcriptions of vocal works, for instruments **Example: Bizet's *Carmen* reduced to piano solo**
 - 4.a.ii. Transcriptions of instrumental works, for voices **Example: Barber's *Agnus Dei*, the composer's transcription for choir of 2nd movement of *String quartet/Adagio for strings***
 - 4.b. New instrumental works based on vocal source material **Example: Sarasate's *Concert Fantasies on Carmen***

[Note to editor: Have added a work to 4.b.ii to the image, which previously said "no example"]

Figure 2. Taxonomy of vocal-instrumental categorization issues

The first issue highlighted by the taxonomy concerns the instability of individual musical works: some musical works could be considered vocal or instrumental depending on the individual performance, publication, and other factors. For example, Mozart's Overture to *Le nozze di Figaro* (1.a.i), is an instrumental part (overture for orchestra) of a vocal whole (opera): when played at the beginning of the opera it is vocal, but if the overture is played as part of a concert of orchestral music, then the "same" music is instrumental. Furthermore, even if this entirely instrumental overture is performed in a concert without the rest of the opera, does it carry any of its vocal elements through to that performance, as a kind of vocal shadow? This asks important questions about medium as a classificatory facet, and whether it can be defined as "just" who is playing and singing.

A similar issue about instability arises with works where the original is vocal, but it can be performed as instrumental (or vice versa). The transformation of vocal works into instrumental ones could be caused by pragmatism; composers realize that their works are more performable if they omit expensive elements such as choruses and vocal soloists. For example, Wagner's "Liebestod" from *Tristan und Isolde*, can be performed in the concert hall with a soprano singing Isolde's part, or without the soprano's contribution (2.a.ii), making the placement of this work into a vocal or instrumental category problematic. Instrumental works transforming into vocal works employs a whole new set of considerations (2.b), as there are also questions about whether the addition of text changes the musical work itself, not just the medium – see for example, *I vow to thee, my country*,

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

which sees part of an existing instrumental work (Holst's *The Planets*) transformed into a vocal work (the hymn).

A critical aspect of vocal/instrumental fuzziness concerns genres which themselves cross the vocal/instrumental boundary, and their associated classification issues. Perhaps the most significant example of these is choral symphonies, due to the central role of specific choral symphonies within the Western art music canon. *The Oxford Dictionary of Music* (2013) defines a choral symphony as "a symphony in which a chorus is used at some point". So, the choral symphony is defined in terms of its vocal medium ("Chorus" is a specific type of vocal medium) and its form/genre of symphony. However, *Grove Music Online*'s entry for symphony suggests the term "symphony" is "... now normally taken to signify an extended work for orchestra" (Larue et al., 2006). Thus, both the vocal and instrumental categories are associated with choral symphonies; they are a *vocal* example of a form/genre specifically associated with an *instrumental medium*. So, the choral symphony is simultaneously vocal *and* instrumental, which is problematic for LIS classification schemes structured around a dichotic categorization of musical medium into vocal and instrumental. For example, placing a work such as Beethoven's Symphony No. 9, which is structurally a symphony but feature a chorus in its final movement, in a scheme such as *BCMC* illustrates these issues. Faced with a strict vocal/instrumental division, the classifier has two options, both unsatisfactory: ignore the voices and class the work with orchestral medium, which allows the form/genre of "symphony" to be added to the classmark; or, classify the work's choral medium, but omit the "symphony" as there is no mechanism to add the form/genre of symphony to a vocal medium.

So, LIS classification displays a fundamental and binary categorization between vocal and instrumental. However, this taxonomy demonstrates that the concept of a binary vocal/instrumental categorization is exactly that: a concept. Under the scrutiny of trying to place types of musical works and specific musical performance practices into these two categories, this seemingly solid categorization appears more like classificatory quicksand. So, LIS classification would benefit from a new way of thinking about the classification of voices and instruments in order to classify the real world of musical works.

Arrangement and accompaniment

Binary categorization and specification of type

Accompaniment and arrangement present a number of classification challenges. Accompaniment as a classificatory element appears to be a combination of two ideas: a binary categorization between the accompanied and unaccompanied; a specification of the instruments (or voices) making up that accompaniment. Sometimes the two sub-facets are not even next to each other in the citation order. For example, *Flexible*'s vocal music citation order gives much prominence to whether the musical work has an accompaniment or not (in Table 1 and Table 2, represented by "AcX"), outside of *what* that accompaniment is, with the two different accompaniment-related sub-facets not adjacent. An alternative manifestation of the presence of two separate ideas can be seen in the introduction to *BCMC* (Coates, 1960, p. x), which states that unaccompanied should be treated as a type of accompaniment. So, *BCMC* is separating out the unaccompanied from the accompanied, but by treating unaccompanied as a type of accompaniment rather than a separate sub-facet.

This binary sub-facet idea is to some degree shared by arrangement: the arrangement sub-facet is a similar combination of binary arranged/not arranged sub-facet and the specific medium. Some schemes only choose to include the first part, to say that the work is arranged; for example, *Library of Congress Classification* (Library of Congress, 2015) has no capacity for specifying the original medium when classifying an arrangement. So, it seems that both accompaniment and arrangement are compound ideas and would not be best served in LIS classification by a simple characteristic of division.

Listing of accompaniment and arrangement foci

Accompaniment and arrangement are also affected by another issue: in enumerative (and not-fully faceted) schemes, listing foci for specifying an arrangement and accompaniment would repeat the foci listed for the main part of the medium. So, one hypothesis about the *Library of Congress Classification* example is that it does not allow specification of the original medium, as to do so would require listing every possible type of medium for the original, for every type of arranged medium. Obviously, a faceted structure can circumnavigate these issues as it has the mechanism to re-use foci from other sub-facets, allowing a full expression of the details of the original or arranged medium without extending the length of the schedules. *BCMC* mostly chooses to take this broad approach, allowing for additions of specific accompaniments taken from the rest of the medium schedules. It is clear that it would be helpful for a model of medium classification to allow for accompaniment and arrangement to utilize the foci (and if necessary, the other sub-facets) from elsewhere in medium.

Impact of vocal/instrumental categorization on accompaniment and arrangement

Closer examination shows how existing LIS schemes appear to treat accompaniment and arrangement differently depending on whether the music is vocal or instrumental. The three schemes show how the actual accompaniments are assumed to be instrumental rather than vocal. Furthermore, the three schemes also treat the accompaniment of vocal music differently from the accompaniment of instrumental music. For example, *BCMC* sees vocal music generally assuming a keyboard accompaniment whereas instrumental music makes no such assumption. The three schemes also show arrangement is often assumed to be an instrumental concern. The term “instrumentation” (as well as harmonization) is used in *Flexible* to describe what is generally accepted to be an “arrangement”; *BCMC* has an arrangement sub-facet for its instrumental medium facet but not for vocal music (Coates, 1960, p. x).

There is some musicological warrant about making both of these assumptions. For instance, mediums such as orchestra accompanied by choir are not meaningful in extant Western art music. However, while such mediums would have no basis in the real world of Western art music (so far), they would be logical inclusions from a classification perspective and within the bounds of a purely faceted classification structure. Furthermore, if LIS schemes could allow for them, not only would this create a more perfected faceted structure of music, it would also allow for any future permutations of musical medium. The LIS classifications of arrangements reflect the music domain’s reflections about the dominance of instrumental-to-instrumental arrangements from the Baroque era onwards (Boyd, 2001), as also codified in the music domain proto-taxonomy of arrangements by Keller (1969) which gives primarily instrumental examples. However, vocal arrangements exist, as

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

do (occasionally) arrangements between vocal and instrumental music (and vice versa), and a more idealistic and open structure of medium classification would also allow for such possibilities.

A similar situation arises for the broad categorization of size, where sometimes the accompaniment of groups is treated differently from the accompaniment of ensembles; furthermore, some broad size foci are not permitted to be the accompanied or accompaniment, such as there being no way of a work for orchestra being accompanied by piano in schemes such as *BCMC* or *Flexible*. Therefore, a model of LIS classification would benefit from accompaniment and arrangement sub-facets which are entirely free from both vocal/instrumental and broad size categorizations, for the purposes of a truer faceted structure and being open to works of any musical medium, however fanciful.

Multiples and numbers in musical medium

The sub-facets for multiple instruments

Numbers of things, and their corresponding types of things, are a very important and complex part of classifying musical medium. Such are the issues that even a heavily faceted scheme such as *BCMC* sees its faceted features break down when, say, trying to combine instruments: the instrumental ensemble schedules of *BCMC* (Coates, 1960, pp. 30-31) feature compound foci for combinations of instruments, which when broken down, do not reveal their constituent parts.

The problems with classifying instrument ensembles are explored in Lee (2017c) and will be briefly summarized here. Examples of instrumental ensembles include a trio for flute, oboe and bassoon, and a string quartet (two violins, viola and cello). At their essence, classifying ensembles is a specific and complex example of classifying type-of-thing and number-of-thing. However, there are two extra complications. Instrumental ensembles often include multiple types of things, each with their own numbers – for example, two violins in a string quartet but only one viola. The second complication concerns what is missing from a simple type-of-instrument and number-of-instrument pairing: the intrinsic qualities wrought by the shared (or not) qualities of all the instruments in that ensemble and the qualities stemming from being an ensemble of a specific size. For instance, a string quartet has qualities from the interaction of four parts, which differs from the interaction between only two parts; similarly, a work for all stringed instruments has a certain timbre, information which is not explicit if only the individual instruments are classified. Lee (2017c) summarizes that there are actually four sub-facets for this area of musical medium, and furthermore, they have interesting and varied sets of relationships between each other – the sub-facets and their relationships are reproduced in Figure 3. A further set of up to four more sub-facets especially relevant to ensembles and keyboard instruments are discussed in Lee (2017c), but are not

discussed further in this article which focuses on a general model of medium.

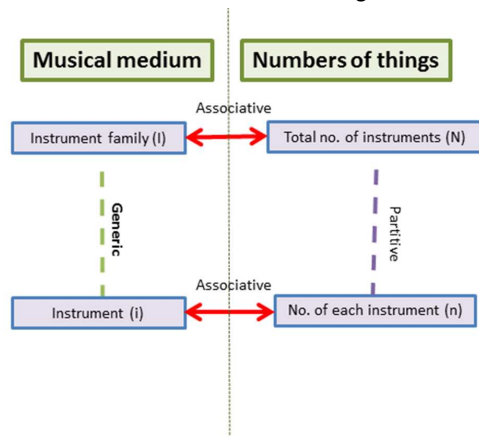


Figure 3: The interrelationships of sub-facets associated with multiple instruments

When considering the three example LIS classification schemes it can be seen that these schemes do not include all of the four sub-facets identified in Lee (2017c), only a sub-section; furthermore, they do not show the relationships between these sub-facets, thus neglecting some critical information about the medium. So, a model of musical medium classification would benefit from closer consideration of the issue of instrumental multiples.

Multiples for voices and groups

However, while instrumental ensembles may have issues in their treatment within LIS classification schemes, it is clear that the concept of multiple voices and multiple groups is even more embryonic. LIS classification schemes generally have less provision or instructions for vocal ensembles, than they do for instrumental ensembles – examples of vocal ensembles include one soprano, one alto, one tenor and one bass, or, two tenors and a baritone. For example, *BCMC* is unclear how to add together multiple voices, in particular when dealing with two voices of the same type.

In addition, solo voices also appear as part of larger mediums; a musical work may be written for choir, orchestra and a number of vocal soloists. For example, Mahler's Symphony No. 8 has 3 sopranos, 2 altos, 1 tenor, 1 baritone and 1 bass, in addition to its three choirs and orchestra. Classifying this group of soloists within LIS classification schemes presents the same issues presented by multiple instruments. First, there is often an inability or confusion about whether concepts such as three sopranos can be represented by three + soprano, or have to be expressed using soprano + soprano + soprano. In *BCMC*, representing each soloist means adding each soloist separately to the classmark: so, just the soloists for Mahler's Symphony No. 8 would have an extremely unwieldy classmark of FLFLFLQFQGHGNGX. Second, LIS schemes do not appear to allow for expressing both total number of vocalists and numbers of each type of voice. For instance, *Flexible* (Petthes 1967, p. 47) has an example where only the total of nine voices is represented, and it is not possible to also include the individual voices. Hence, a model of musical medium would benefit from clarity in how multiple voices are classified, including provision for total size and number of each individual voice.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Multiple groups also present interesting classification issues; examples of multiple groups include two orchestras, three choirs, and so on. For example, Mahler’s Symphony No. 3 includes a women’s choir and a children’s choir. The three example classification schemes find the combination of women’s choir and children’s choir difficult to accommodate: *BCMC*, *Dickinson* and *Flexible* have no mechanism for combining different groups. While the combination of women’s choir and children’s choir can be accommodated through an umbrella class in *BCMC*, other combinations of groups are not so easily accommodated in the scheme; furthermore, the lack of faceting for combinations of groups in *BCMC* is telling. While *Flexible* has some pre-coordinated classes for multiple groups, the combination of women’s and children’s choirs, as used in Mahler’s Symphony No. 3, is not included in *Flexible*. Dickinson has a sub-facet for type of choir but there is no provision for repeating it, so again, the choirs of Mahler’s Symphony No. 3 are not fully classifiable. The impact of this lack of provision in LIS classification schemes is that the mediums of works such as Mahler’s Symphony No. 3 cannot be fully expressed; furthermore, in some situations, the classification selected would be misleading. Therefore, a model of musical medium should look towards extending the concept of multiples to groups, in order to represent the existing canon of Western art music and to also proffer possibilities for mediums of future musical works.

A classification model of the musical medium facet

A model of musical medium is now proposed – See Figure 4 – which draws upon the analysis of LIS classification in the article. The analysis of the sub-facets of musical medium, their orders and inner mechanisms, are utilized in this model, and redrawn; the radical structure of the model serves to both reflect LIS classification of musical medium and to attempt to resolve its many issues.

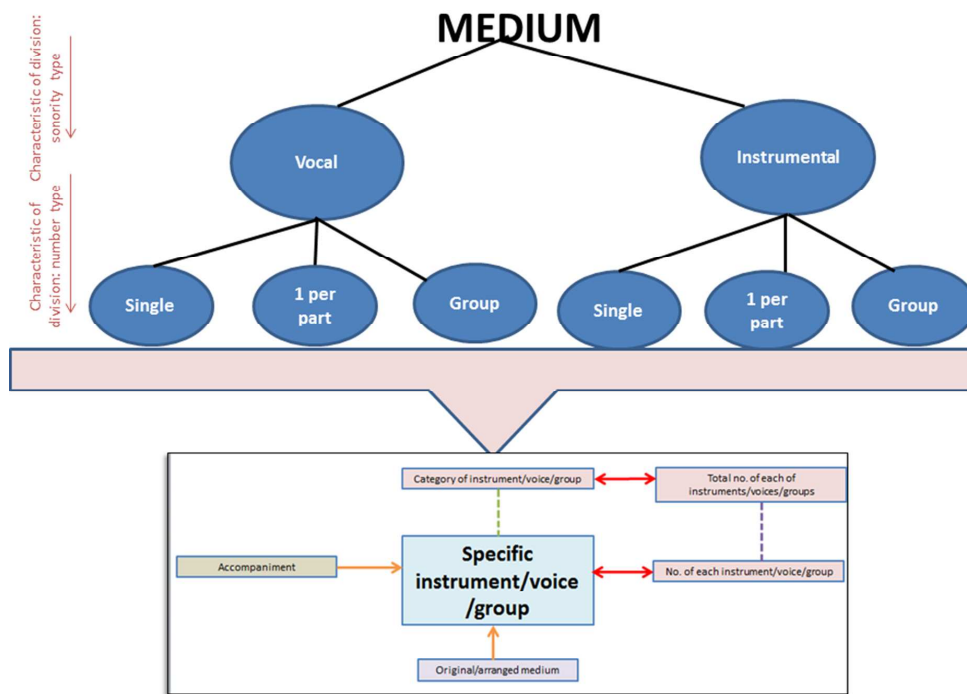


Figure 4: A model of musical medium classification

The structure and features of the model of musical medium

The model's unusual structure and features are noteworthy in their own right; however, it will be shown that these structural features are pivotal in resolving the issues associated with classifying musical medium as identified earlier in this article. The model is divided into two, differently-structured parts, which is an unusual feature for a classification system. The first part presents musical medium as a series of two hierarchical divisions with their respective foci, for example, "vocal" and "group". (Note these foci are listed in the model due to their small number and standardization in LIS classification schemes.) The second part contains a set of interactions between various sub-facets of medium, rather than purely hierarchical divisions and their respective foci. Both parts of the model to some degree reflect LIS classification as found in the study of citation order and sub-facets, discussed in the Section "Determining the sub-facets of musical medium and their order". The first part of the model shows the definitive hierarchies of vocal/instrumental categorization, followed by categorization into broad size. The second half of the model reflects how LIS classification schemes offered no definitive order of elements, and that some elements are irrelevant for some mediums. However, it will be shown that the structure of the second part of this model moves far beyond what was found in existing LIS schemes, proposing a completely new type of classificatory structure.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

The second part of the model offers a new way of thinking about classifying musical medium by placing a single occurrence of “specific instrument/voice/group” at its centre. Instead of having a separate section for arrangement, accompaniment and multiples, the “specific instrument/voice/group” is positioned as a sub-facet, where it connects to ideas such as arrangement, accompaniment and number-of-thing; so, the model is showing how the piano in “piano accompaniment” and “piano duet” is actually the same “piano”. While some LIS schemes demonstrate this practically when, say, classifiers take a list of instruments from one part of the scheme to add to another, this model is novel in generalizing this action and conceptualized this central occurrence of the “specific instrument/voice/group”.

The Section “Binary categorization *and* specification of type” demonstrated that both accompaniment and arrangements can be represented in existing LIS schemes as binary statements of presence (yes/no) and/or specific instruments/voices/groups (piano, flute, orchestra, and so on). In the proposed model, the accompaniment and arrangement sub-facets represent *two types of relationship*: an independent sub-facet with a binary yes/no focus, and something which acts as an instruction to add another sub-facet (specific instrument/voice/group). For instance, a work for flute with piano accompaniment will have one occurrence of the instrument/voice/group sub-facet as “flute”, with an additional combination of accompaniment with focus “yes” and a second iteration of “instrument/voice/group” with focus of “piano”. This double relationship type is indicated visually in Figure 4: the accompaniment and arrangement sub-facets are linked to “specific instrument/voice/group” using a single-headed arrow and utilize a different colour from other relationships. So, this model reflects LIS classification’s desire for two types of information for these areas, while also integrating accompaniment and arrangement into the heart of the model via the central specific instrument/voice/group sub-facet.

However, the Section “Impact of vocal/instrumental categorization on accompaniment and arrangements” also illustrated several issues in existing LIS classification where choices of accompaniment and arrangement are limited by the vocal/instrumental and broad size categorizations. For instance, arrangements and accompaniment are often assumed to be instrumental and certain instrument/accompaniment combinations could not be accommodated in LIS schemes. In this model the arrangement and accompaniment sub-facets are equally applicable to vocal and instrumental music, and can be attached to any type of broad size categorization. So, arrangements can be vocal, and accompaniments can be vocal. Full details about the arranged or original medium can be added, depending on your starting point. Furthermore, the lack of dependency between different sub-facets makes a more hospitable system: a musical work for orchestra accompanied by piano, or orchestra accompanied by choir, would have a home using the proposed model.

The model also resolves an important issue identified in Section “Multiples for voices and groups”: the lack of provision for multiple voices and multiple groups. While Lee (2017c) showed how a connected series of sub-facets relating to multiple instruments can be useful to express instrumental chamber music, this model goes further: voices and groups are also included in this loop-like structure. (The foci for “Category of instrument/voice/group” are less clear-cut for voices and groups than they are for instruments and there are a number of possibilities; nevertheless, this does not detract from the usefulness of these sub-facets and the multiples “loop”.) For example, the female and children’s choir in Mahler’s Symphony No. 3 can be accommodated in this model; each

choir type would be a focus within “Specific instrument/voice/group” and these would be attached to the focus of “1” within the “No. of each instrument/voice/group” sub-facet. So, any combination of groups is theoretically possible, unlike in the example LIS classification schemes.

Moreover, more than one of the same voice or group can also be accommodated. For example, the eight soloists in Mahler’s Symphony No. 8 could be represented both in their totality – “Total of each of instruments/voices/groups” would have a focus of “8” – and their individual voices, with the sopranos being attached to a value of “3” in the “No. of each instrument/voice group” sub-facet. Again, this is an improvement on existing LIS schemes, both in being able to represent total numbers and numbers of specific voices, and the efficiency in attaching “3” to “soprano” rather than listing “soprano” three times. The loop can represent the whole medium, as the second part of the model works by repeating the central “specific instrument/voice/group” sub-facet as many times as needed; so, for the Mahler’s Symphony No. 8 example given above, the “specific instrument/voice/group” sub-facet can be used for each soloist with its associated loop, then for each type of choir, and then for the orchestral accompaniment. In fact, using this model, even the gargantuan medium of Havergal Brian’s Gothic Symphony, which includes four adult choirs, two different types of children’s chorus, large orchestra and off-stage bands can be accommodated. Therefore, the model solves the problems presented by classifying multiple instruments, voices and groups, which also aids in the classification of especially “large” mediums.

Finally, the model also provides some remedy to the issues presented by strict vocal/instrumental categorization. While the first part of the model has a strict categorization into vocal and instrumental, the second part of the model has no such division. To start, voices and instruments are treated collectively as part of a single sub-facet. Not only does this bring together the voices and instruments on a conceptual level but is also the mechanism which allows for voices and instruments to be treated equably for accompaniment and arrangement. The second part of the model also works independently from the first part which helps to express the fuzziness of real-life vocal/instrumental categorization in musical works. For example, a work for soprano soloist and orchestra might be classified as instrumental or vocal in the top part of the model. However, whatever the outcome of the instrumental/vocal designation in the first part, both “soprano” and “orchestra” can be represented in the second part even though they are from different sides of the vocal/instrumental divide. Thus, in some respect, this model could be seen as conciliatory: it both honours the traditional LIS partition between vocal and instrumental music in the first part of the model, then brings together elements from both parts of the divide in the second part of the model, when the universe of Western art music requires this.

The “vocinstrumental” extension

Nevertheless, the first part of the medium model as presented still reflects a strict binary divide into vocal or instrumental. This is problematic, as the Section “Musical works as blurred vocal/instrumental categorization” attests, because the reality of classifying musical works demonstrates much blurring of this boundary. Therefore, Figure 5 presents an alternative version of the medium classification model (Figure 4) which represents a more graduated approach to the vocal and instrumental categorization. It adds an extra focus to the first characteristic of division (by sonority): “vocinstrumental”, a newly-created term for this research which is a portmanteau term devised from combining “vocal” and “instrumental”. It is presented as a possible solution to the fuzziness involved with categorizing musical mediums, acting as a holding space for the medium of

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

musical works which do not fulfil the rigorous categorization into vocal and instrumental. It should be noted that the “vocinstrumental” focus is not a layout seen in existing LIS classification schemes; instead it is an innovative solution to the vocal/instrumental categorization issues. Its novelty lies in grouping together at conceptual level types of musical work which are not usually considered to have shared characteristics. Therefore, this new category of vocinstrumental challenges the tenets of traditional structures to classify music.

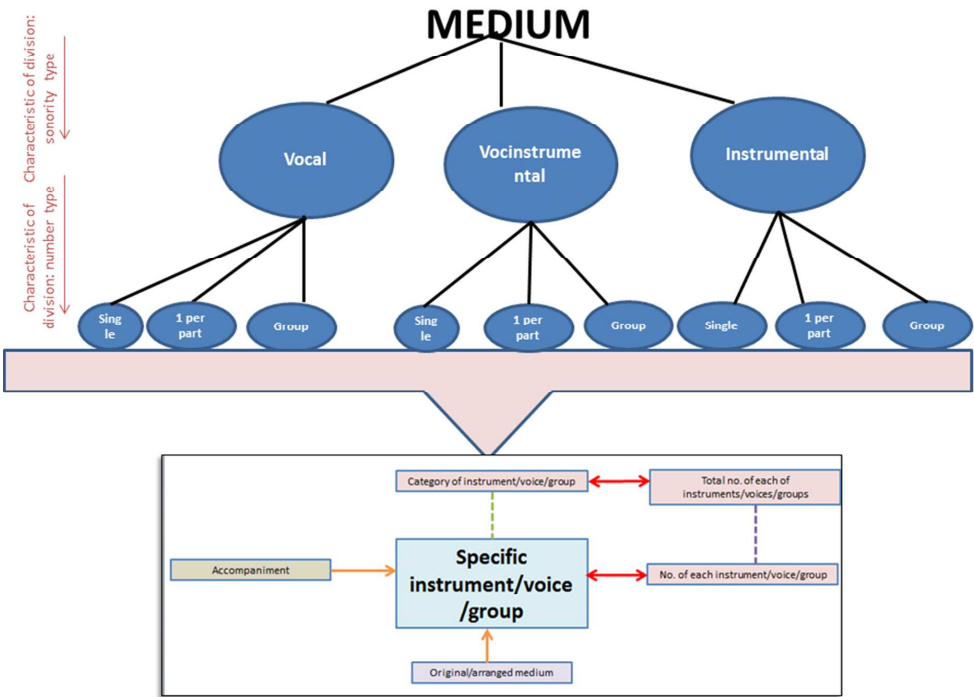


Figure 5: Model of musical medium with additional category “vocinstrumental”

In order to see how this new category would work in practice, it is useful to see how an example of a type of musical work which struggles with a binary vocal/instrumental categorization would fare in this amended model. So, we revisit choral symphonies, and the specific example of Beethoven’s Symphony No. 9, to see whether having a category of vocinstrumental would help the choral symphony classification woes. At a simple level, the vocinstrumental category helps to classify these works; it provides a space where voices and instruments are both included without necessity for one to be designated as more important. Clear-cut choral symphonies such as Beethoven’s Symphony No. 9 would live in this vocinstrumental category, providing a useful resolution: the Section “Musical works as blurred vocal/instrumental categorization” gave an example of an existing LIS classification scheme which forces the classifier to either not mention voices at all or uneasily classing it as vocal music, even though much of the work is for orchestra alone. However, the proposed vocinstrumental category circumnavigates this issue and provides a home for Beethoven’s Symphony No. 9, choral symphonies generally, and potentially many of the works presented in the taxonomy of vocal/instrumental issues.

Nevertheless, the vocinstrumental category also introduces some new issues, mostly related to accompaniment. The vocinstrumental category introduces a new fuzzy boundary: at what point does a work move between being vocinstrumental and vocal-with-instrumental? For example, a work for soprano accompanied by piano could fit into the “vocal, single” category if the piano accompaniment is *not* counted as part of the sonority, but would be “vocinstrumental, 1-per-part” if the accompaniment is counted in the designation of sonority. Problematically, the difference between the two is based on ascertaining accompaniment, yet there is sometimes subjectivity in deciding between vocal-with-instrumental-accompaniment versus equal-vocinstrumental-partners. For example, the Section “The elements of musical medium” mentioned Schubert songs and how the piano could be considered equal to the voice: with the vocinstrumental category being the highest characteristic of division, this means potential scattering of similar works if some classifiers decide on “vocal” and others choose “vocinstrumental” due to different conceptions of the role of the piano in Schubert’s songs. So, the vocinstrumental extension is extremely helpful for modelling musical medium and if adopted would improve the classification of music; however, like the classification of any subject, the subjectivity involved in ascertaining the significance of one part of a subject over another means the vocinstrumental category is not a perfect solution.

Conclusion

Classifying musical medium, the bedrock of notated Western art music, is complex. This article first explored these complexities through the lens of LIS classification schemes, showing the typical sub-facets and order of elements, as well as the limitations imposed by traditional LIS scheme structures. This analysis showed *how* musical medium is complex and helped to explain why notated Western art music is complicated to classify in real life. Then a model of musical medium classification was presented, which is novel in structure. Redrawing the structure of medium as two parts, with a centralized instrument/voice/group at the centre of the second part, resolved many of the complexities found within LIS classification of music. For instance, the dependency between accompaniment and the vocal/instrumental categorization is broken up in this model, thus allowing for unusual and perhaps as yet un-composed musical mediums. Problematic multiple groups and multiple voices are also adequately accommodated, moving beyond the provision in the analysed LIS classification schemes. Furthermore, this model and its vocinstrumental extension offer novel solutions to a foundational issue in music classification: the collective treatment of voices and instruments in the second part of the model, coupled with the new vocinstrumental category in the first part of the model, help transverse the divide between the strict vocal/instrumental binary categorization envisaged by LIS classification and the fuzzier boundary found in real-life musical works. So, this research provides close analysis and a radical rethinking of the classification of musical medium.

However, the potential benefits of this model extend beyond the classification of notated Western art music. The next stage to this research would see its findings applied to other conceptions of music, such as Western art music as sound, popular music or traditional music. Furthermore, the analysis and model have implications for other types of music metadata creation and music information retrieval. A deeper understanding of the construction of musical medium is beneficial to the manipulation of music information: for instance, this study found types of information about music which are not normally considered such as broad size categorization, it discovered that so-

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

called solid categorizations at the heart of music classification are actually softer than originally though, and it highlighted the complex web of relationships between aspects of music information. All of these findings are invaluable for those researching and constructing systems to retrieve music information.

The model's novel way of structuring and visualising medium classification not only furthers research into music information, but also contributes to classification research more generally. For example, the model presents two types of classification within the same model and makes use of a loop structure to highlight a series of interlinked relationships between sub-facets. The model's structure could be used to unpick classification issues for other, problematic subjects in the future. In addition, how far this model stays within the boundaries of a faceted classification structures asks an interesting question about contemporary conceptions of faceted-ness, and could be explored to great effect. Therefore, the impact of the analysis and new model of musical medium goes beyond music classification: it contributes novel ways to consider complex subjects and radically rethinks the structure of classification schemes themselves.

References

Boyd, M. (2001), "Arrangement" in *Grove music online*, available at: www.oxfordmusiconline.com (accessed 17 November 2014).

Bryant, E.T. and Marco, G.A. (1985), *Music librarianship: a practical guide*, 2nd ed., Scarecrow Press, Metuchen, N.J.

The Oxford dictionary of music (2013), "Choral symphony", Kennedy, M. (Ed.), *The Oxford dictionary of music*, 2nd rev. ed., available at: www.oxfordmusiconline.com (accessed 28 October 2013)

Coates, E. (1960), *The British catalogue of music classification*, Council of the British National Bibliography, London.

Cutter, C.A. (1902), "Shelf classification of music", *Library Journal*, Vol. 27 February, pp. 68-72.

Cutter, C.A. (1891-1904), *Expansive classification*, s.n., Boston.

Dahlhaus, C. (1982), *Esthetics of music*, translated by W. Austin, Cambridge University Press, Cambridge.

Davies, D. (2011), "Medium", in Gracyk T. and Kania, A. (Eds.), *The Routledge companion to philosophy and music*, Routledge, London, pp. 48-58.

Dickinson, G.S. (1938), *Classification of musical compositions: a decimal-symbol system*, Reprinted in Bradley, C.J. (Ed.) (1968), *The Dickinson Classification: a cataloguing & classification manual for music, including a reprint of the George Sherman Dickinson classification of musical compositions*, Carlisle Books, Carlisle, Penn.

Elliker, C. (1994), "Classification schemes for scores: analysis of structural levels", *Notes*, Vol. 50 No. 4, pp. 1269-1320, available at: <http://www.jstor.org/stable/898291> (accessed 29 November 2010).

- Fuller, D. (2016), "Accompaniment" in *Grove music online*, available at: www.oxfordmusiconline.com (accessed 13 May 2016).
- Keller, H. (1969), "Arrangement for or against?", *Musical Times*, Vol. 110 no. 1511, pp. 22-25.
- Larue, J., Wolf, E.K., Bonds, M.E., Walsh, S. and Wilson, C. (2006), "Symphony" in *Grove music online*, available at: www.oxfordmusiconline.com (accessed 12 November 2013).
- Lee, D. (2012), "Faceted music: towards a model of music classification", in Gilchrist, A. and Vernau, J. (Eds.) *Facets of knowledge organization: proceedings of the ISKO second biennial conference, 4-5 July 2011, London, U.K.*, Emerald, Bingley, pp. 339-351.
- Lee, D. (2017a), *Modelling music: a theoretical approach to the classification of notated Western art music*, Unpublished Doctoral thesis, City, University of London, available at: <http://openaccess.city.ac.uk/17445/> (accessed 26 July 2017).
- Lee, D. (2017b), "Conceptions of knowledge about classification schemes: a multiplane approach", *Information Research*, Vol. 22 no. 1, available at: <http://www.informationr.net/ir/22-1/colis/colis1648.html> (accessed 26 July 2017).
- Lee, D. (2017c), "Numbers, instruments and hands: the impact of faceted analytical theory on classifying music ensembles", in Slavic, A. and Gnoli, C. (Eds.), *Faceted classification today: theory, technology and end users, proceedings of the 2017 UDC seminar, 14-15 September 2017*, Ergon Verlag, Würzburg, pp. 77-92.
- Library of Congress (2015), *[Library of Congress Classification]. M. music and books on music*, Library of Congress, Washington, D.C., available at: <https://www.loc.gov/catdir/cpsol/lcco/> (accessed 11 May 2015).
- Line, M.B. (1952), "A classified catalogue of musical scores: some problems", *Library Association Record*, Vol. 54, pp. 362-364.
- Line, M.B. (1963), "Classification for music on historical principles", *Libri*, Vol. 12 no. 4, pp. 352-363.
- Matheson, C. & Caplan, B. 2011, "Ontology" in Gracyk T. and Kania, A. (Eds.), *The Routledge companion to philosophy and music*, Routledge, London, pp. 38-47.
- Merriam-Webster English dictionary* (2016), "Art music", Merriam-Webster English dictionary, available at: <http://www.merriam-webster.com> (accessed 16 November 2016).
- Moore, G. (1959), *The unashamed accompanist*, Rev. ed., Methuen & Co, London.
- Nettl, B. (1960), *Library classification of music: description and critique of selected systems*, Unpublished Master's thesis, University of Michigan.
- Ott, A. (1961), "The role of music in public libraries", in Sherrington, U. and Oldham G. (Eds.), *Music libraries and instruments: papers read at the Joint Congress, Cambridge, 1959 of the International Association of Music Libraries and the Galpin Society*, Hinrichsen, London, pp. 79-83.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Oxford English Dictionary (2008), "Art music", *Oxford English Dictionary*, available at: www.oed.com (accessed: 16 November 2016).

Pethes, I. (1967), *A flexible classification system of music and literature on music*, Preprint, Centre of Library Science and Technology, Budapest.

Pieterse, V. and Kourie, D.G. (2014), "Lists, taxonomies, lattices, thesauri and ontologies: paving a pathway through a terminological jungle", *Knowledge Organization*, Vol. 41 no. 3, pp. 217-229.

Ranganathan, S.R. (1963), *Colon Classification: basic classification*, revision of 6th ed., Asia Publishing House, Bombay.

Ranganathan, S.R. and Gopinath, M.A. (1987), *Colon classification*, 7th ed., Sarada Ranganathan Endowment for Library Science, Bangalore.

Redfern, B. (1978), *Organising music in libraries. Volume 1: arrangement and classification*, 2nd ed., Clive Bingley, London.

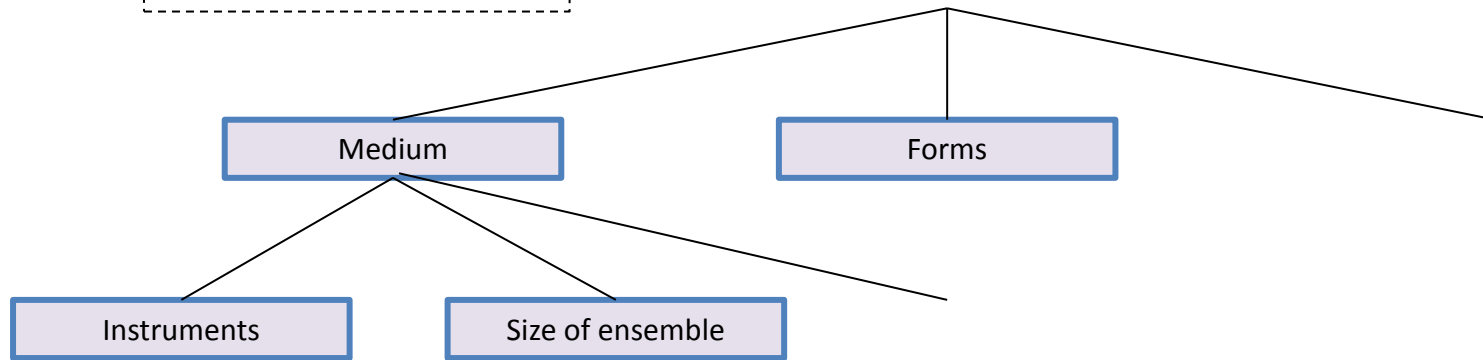
Smiraglia, R.P. and Young, J.B. (2006), *Bibliographic control of music, 1897-2000*, Scarecrow Press, Lanham.

Vickery, B.C. (1959), *Classification and indexing in science*, 2nd ed., Butterworths Scientific Publications, London.

Vickery, B.C. (1975), *Classification and indexing in science*, 3rd ed., Butterworths, London.

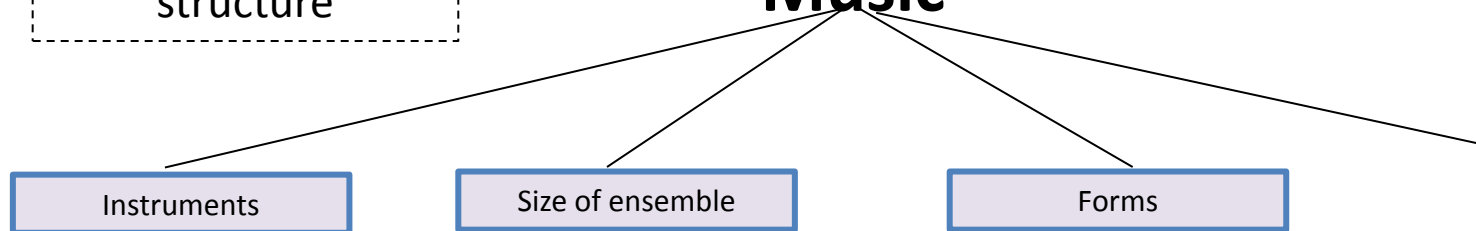
Extract of BCMC's
structure

Music

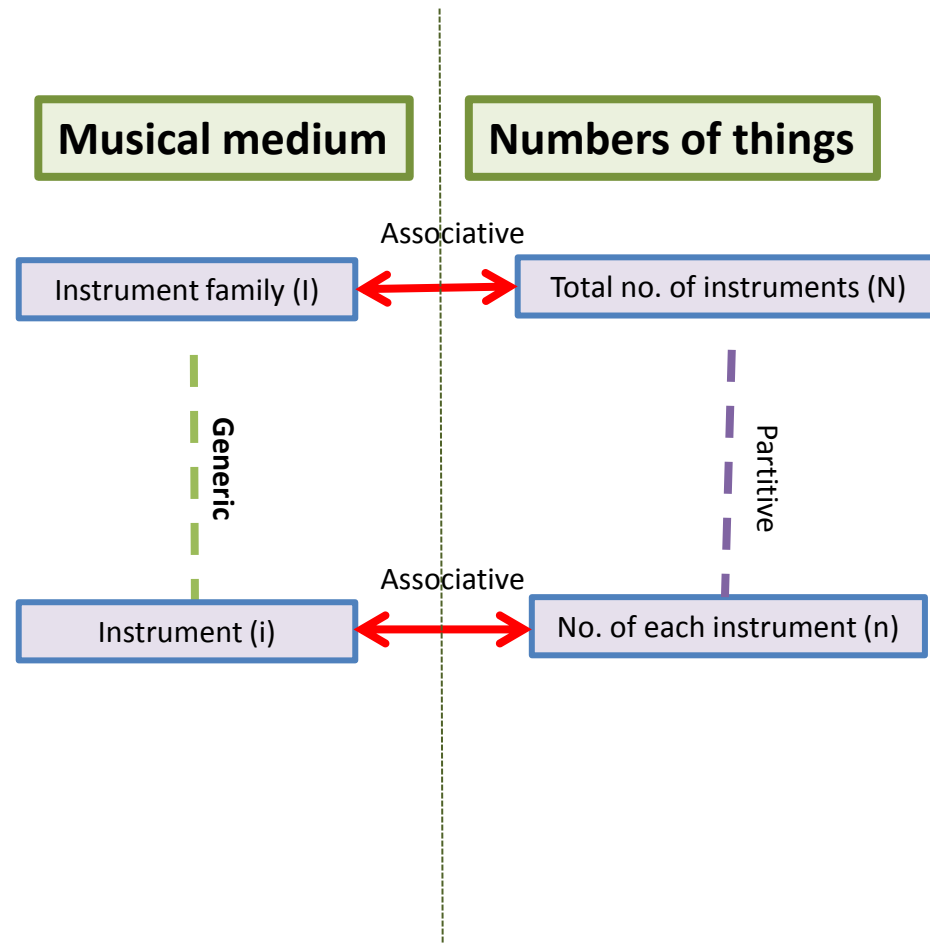


Extract of Redfern's
structure

Music



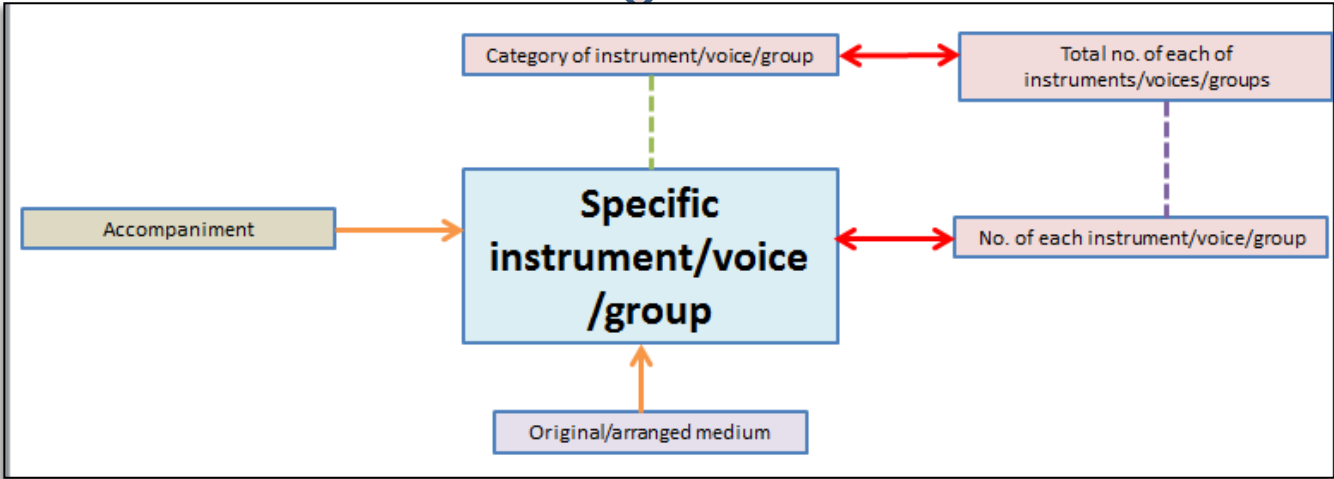
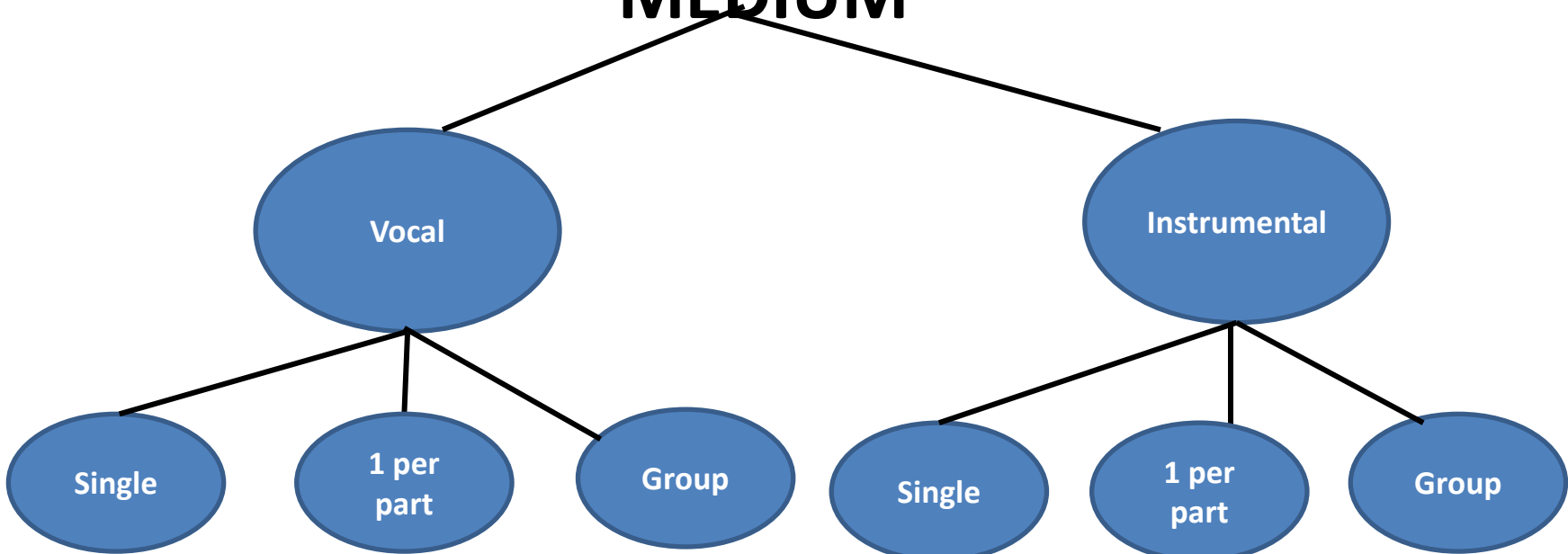
- 1. Medium of whole is different from part
 - 1.a. Vocal whole, instrumental part
 - 1.a.i. Overture **Example: Mozart’s Overture to *Le nozze di Figaro***
 - 1.a.ii. Inter-act prelude **Example: Wagner’s Prelude to Act III from *Lohengrin***
 - 1.a.iii. Ballet/dance movements **Example: Verdi’s Ballet Music from *Aida***
 - 1.b. Instrumental whole, vocal part
 - 1.b.i. Choral symphonies where only one part has voices **Example: Beethoven’s finale from Symphony No. 9**
- 2. Transformation of medium
 - 2.a. Original is vocal, performed as instrumental
 - 2.a.i. Normal form is instrumental **Example: Wagner’s “Ride of the Valkyries” from *Die Walküre***
 - 2.a.ii. Can be performed as instrumental or vocal **Example: Wagner’s “Liebestod” from *Tristan und Isolde***
 - 2.b. Original is instrumental, performed as vocal
 - 2.b.i. Normal form is vocal **Example: Holst’s “Jupiter, the bringer of jollity” from *The Planets*, transformed into the hymn *I vow to thee, my country***
 - 2.b.ii. Can be performed as instrumental or vocal **Example: Elgar’s *Pomp and Circumstance, No. 1*, sometimes sung with the words *Land of hope and glory***
- 3. Defying genre expectations
 - 3.a. Vocal genres, with instrumental elements
 - 3.a.i. Whole **Example: Mendelssohn’s *Lieder ohne Worte* (“Songs without words”)**
 - 3.a.ii. Instrumental movements **Example: “Varhany solo” [movement for organ solo] from Janáček’s *Mša Glagolskaja* (“Glagolitic mass”)**
 - 3.b. Instrumental genres, with vocal elements
 - 3.b.i. Whole **Example: Holst’s *First Choral Symphony***
 - 3.b.ii. Part **Example: Mahler’s Symphony No. 2 (“The Resurrection”)**
- 4. Transcriptions
 - 4.a. Transcriptions (inter-vocal/instrumental transcriptions)
 - 4.a.i. Transcriptions of vocal works, for instruments **Example: Bizet’s *Carmen* reduced to piano solo**
 - 4.a.ii. Transcriptions of instrumental works, for voices **Example: Barber’s *Agnus Dei*, the composer’s transcription for choir of 2nd movement of *String quartet/Adagio for strings***
 - 4.b. New instrumental works based on vocal source material **Example: Sarasate’s *Concert Fantasies on Carmen***



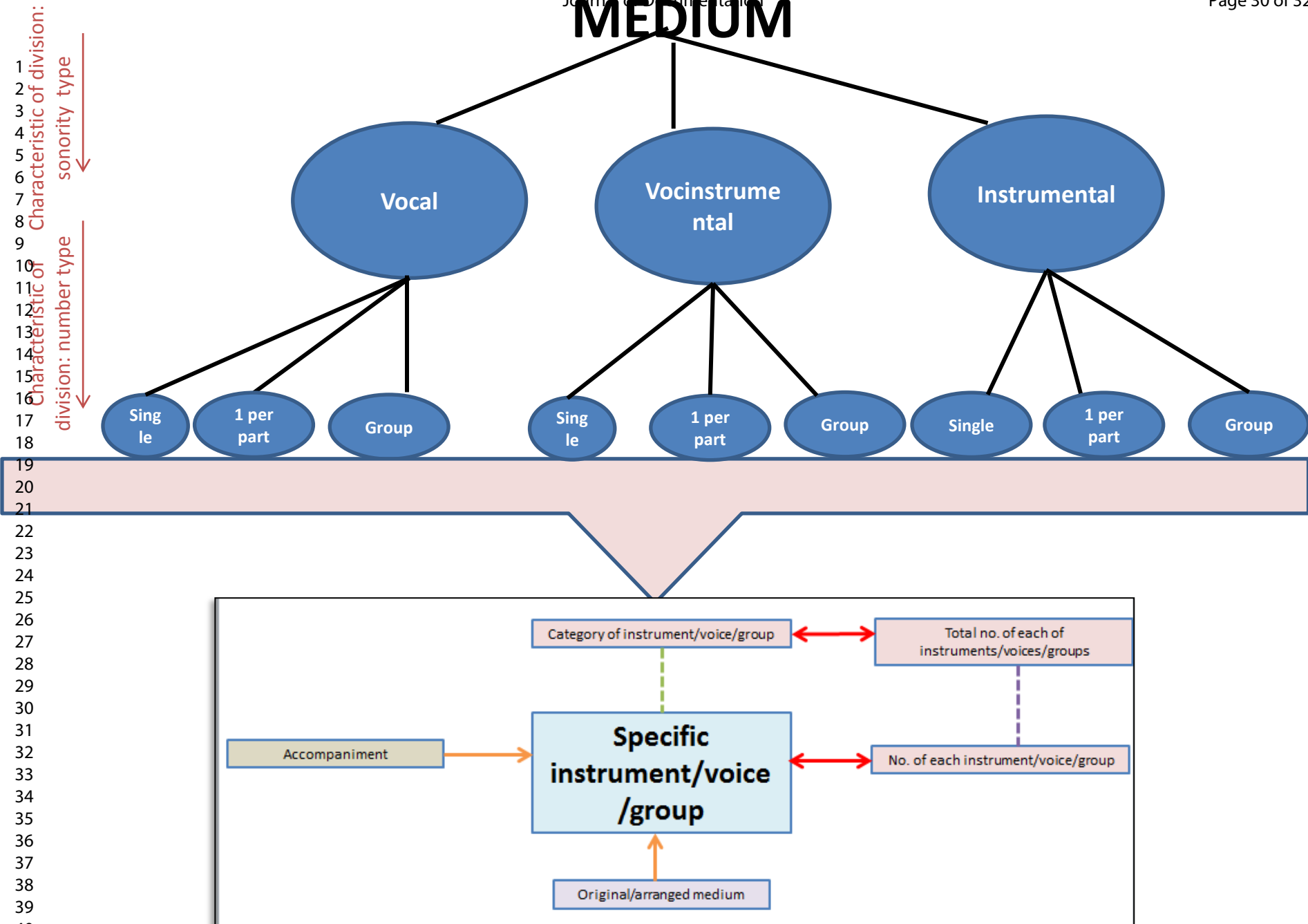
MEDIUM

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41

Characteristic of division
sonority type
↓
division: number type
↓



MEDIUM



Tables for JDoc submission

Table 1

Scheme	Citation order	Source
BCMC (listed)	$I \rightarrow N \rightarrow Ac \rightarrow O$	Introduction
BCMC (actual)	$NX \rightarrow I \rightarrow N \rightarrow Ac \rightarrow O$	Schedules
Dickinson "Combination 1 – Loan and performance libraries"	$NX \rightarrow I \rightarrow Ac \rightarrow N \rightarrow O$	Introduction
Dickinson "Combination 2 – Reference and musicological libraries"	$NX \rightarrow I \rightarrow Ac \rightarrow Ar \rightarrow N$	Introduction
Dickinson "Combination 2a – Reference and musicological libraries"	$NX \rightarrow I \rightarrow Ac \rightarrow N \rightarrow Ar$	Introduction
Dickinson "Combination 2b – Reference and musicological libraries"	$NX \rightarrow I \rightarrow Ac \rightarrow N \rightarrow Ar$	Introduction
Dickinson "Combination 3 – General or small libraries"	$NX \rightarrow I \rightarrow N \rightarrow O$	Introduction
Dickinson "Combination 4 – General or small libraries"	$NX \rightarrow I \rightarrow N$	Introduction
Flexible	$NX \rightarrow N \rightarrow I \rightarrow Ac$ (for groups such as orchestras, "I" can include genre or type of music)	Schedules (Tables: 1 – 4)

Table 1. Sub-facets for instrumental music and the order of their employment, found in *BCMC*, *Dickinson* and *Flexible*

Key: I = instrument; N = total number in ensemble or description of size of group (e.g. size of orchestra); Ac = accompaniment; O = original medium, if classed under arranged medium; Ar = arranged medium, if an arrangement and classed under original medium; NX = whether solo, one-per-part in an ensemble or a group (e.g. an orchestra)

Table 2

Scheme	Citation order	Source
BCMC (listed)	$N \rightarrow V \rightarrow Ac$	Introduction
BCMC (actual)	$NX \rightarrow V \rightarrow N \rightarrow Ac$	Schedules (D - K)
BCMC (alternative schedules – choirs)	$NX \rightarrow V \rightarrow S \rightarrow N$ (Alternative schedules are unclear. Probably actually $NX \rightarrow Ac \rightarrow V \rightarrow S \rightarrow N$)	Alternative schedules (DAAX - EH, and accompaniment from EL)
Dickinson "Combination 1 – Loan and performance libraries"	$NX \rightarrow Ac \rightarrow V \rightarrow N \rightarrow T \rightarrow O$	Introduction
Dickinson "Combination 2 –	$NX \rightarrow Ac \rightarrow Ar \rightarrow V \rightarrow N$	Introduction

Reference and musicological libraries"	→ T	
Dickinson "Combination 2a – Reference and musicological libraries"	$NX \rightarrow Ac \rightarrow V \rightarrow N \rightarrow Ar \rightarrow T$	Introduction
Dickinson "Combination 2b – Reference and musicological libraries"	$NX \rightarrow Ac \rightarrow V \rightarrow N \rightarrow Ar \rightarrow T$	Introduction
Dickinson "Combination 3 – General or small libraries"	$NX \rightarrow V \rightarrow N \rightarrow O$	Introduction; N is included in combination order but omitted in introduction
Dickinson "Combination 4 – General or small libraries"	$NX \rightarrow N$	Introduction; N is included in combination order but omitted in introduction
Flexible	$NX \rightarrow AcX \rightarrow K \rightarrow V \rightarrow Ac$ (solo) $NX \rightarrow K \rightarrow N \rightarrow AcX \rightarrow V \rightarrow Ac$ (ensembles) $NX \rightarrow S \rightarrow AcX \rightarrow K \rightarrow V \rightarrow N \rightarrow Ac$ (groups)	Schedules (Tables: 5 – 7), plus examples in logographs

Key: V = voice type; N = total number in ensemble or number of voices in the choir; NX = whether solo, one-per-part in an ensemble or a group (e.g. a choir); Ac = accompaniment; AcX = whether accompanied or not; S = soloists (in choral music); K = if voice types are known or not; O = original medium, if an arrangement; Ar = arranged medium, if an arrangement and classed under the original medium; T = tessitura, a type of categorization of voice when specific voice-types are not used.

Table 2. Sub-facets for vocal music and the order of their employment, found in *BCMC*, *Dickinson* and *Flexible*